P+ S6000 End User Maintenance Item Descriptions:

Service Item Description	ElectraTherm Part #	Miscellaneous Maintenance Item Requirements/Notes	Estimated Part Costs from ElectraTherm (USD)	*Estimated Maintenance Material Cost (USD)	Total Estimated Maintenance costs (USD)	Estimated Labor Hours Required for Service (hours)	Required Service Maintenance Interval (hours)
Inspect all plumbing, flanges, and valves for leaks/ Check oil catch bottle		*if visual sign of leak present, use liquid leak detector		$ 10.00	$ 10.00	1	4400
Inspect coupling / expander and generator bearings		**Adjust alignment if necessary / check for smooth generator shaft rotation			$ -	1	4400
Grease generator bearings				$ 25.00	$ 25.00	1	4400
Clean cooling vents of generator		*requires cleaning materials		$ 5.00	$ 5.00	1	4400
Inspect hardware for wear/damage		Manually actuate air valves, and inspect rotating equipment			$ -	0.5	4400
Inspect for electrical wear/damage		visual inspection of electrical connections or use infrared camera			$ -	0.5	4400
Inspect electrical box wiring of Generator and Pump Motor		open electrical junction boxes and inspect wire terminations			$ -	0.5	4400
Clean cabinet heat exchanger		visual inspection and cleaning of cabinet heat exchanger			$ -	0.5	4400
Check for NCGs in working fluid					$ -	0.5	4400
Check operation of compressed air system		*May require leak detector			$ -	0.5	4400
Check HX water-side pressure drop		measure and record pressure drop			$ -	0.5	8800
Verify operability of safety equipment		visual inspection of buttons, lights, and labels			$ -	0.5	8800
Clean enclosure / clean LLR		*requires cleaning materials		$ 5.00	$ 5.00	2	8800
Replace PLC and HMI batteries	11214 x2	Machine must be powered on when replaced		$ 15.43	$ 15.43	0.5	17600
Expander Exchange		***Expander is replaced at site with core exchange unit from ElectraTherm	$ 22,266.00		$ 22,266.00	16	22000
Replace VFD internal cooling fan		available from from VFD manufacturer, not stocked by ElectraTherm		$ 300.00	$ 300.00	1	26400
Replace High Side PRVs & Low Side PRVs****	11397 x2 / 11405 x2	replace per local code requirement (4 total PRVs)		$ 1,671.43	$ 1,671.43	2	44000
Replace Generator Bearings		Generator may be have to be removed from ORC		$ 1,000.00	$ 1,000.00	8	92400

Current maintenance intervals are conservative, and may be extended based on field experience.

Estimated hours are based on time to perform service at site, and do not include any mobilization or transportation time to and from the site.

***Maintenance items that are not supplied by ElectraTherm. Cleaning supplies, leak detector solution--these items should be available locally.**

****Requires special tools not provided by Electratherm to align coupling.**

*****The cost for the expander exchange listed here is an amount NET of the following transactions: Owner will issue payment for the amount of a new expander (greater than the amount listed here) and receive a refund when the owner has returned the expander being removed from service, and that used expander is in condition to be rebuilt and or refurbished.**

******PRVs should be replaced immediately if they discharge or show signs of water ingress. PRVs should be replaced at the interval required by local code or every 5 years, whichever is less.**

Detailed instructions and part number details are provided in Operation and Maintenance Manual, available from ElectraTherm Service Department.

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P+ Series 6000: 3 Year End User Routine Maintenance Schedule

	CUMULATIVE RUN TIME HOURS																	
	1 YEAR(8760 HOURS PER YEAR)						2 YEARS(8760 HOURS PER YEAR)						3 YEARS(8760 HOURS PER YEAR)					
	4400HR SERVICE ITEMS			8800HR SERVICE ITEMS			13200HR SERVICE ITEMS			17600HR SERVICE ITEMS			22000HR SERVICE ITEMS			26400HR SERVICE ITEMS		
REQUIRED SERVICE ITEMS	ITEM	HRS	COST	ITEM	HRS	COST	ITEM	HRS	COST	ITEM	HRS	COST	ITEM	HRS	COST	ITEM	HRS	COST
Inspect all plumbing, flanges, and valves for leaks/ Check oil catch bottle	♦	1	$ 10	♦	1	$ 10	♦	1	$ 10	♦	1	$ 10	♦	1	$ 10	♦	1	$ 10
Inspect coupling / expander and generator bearings	♦	1	$ -	♦	1	$ -	♦	1	$ -	♦	1	$ -	♦	1	$ -	♦	1	$ -
Grease generator bearings	♦	1	$ 25	♦	1	$ 25	♦	1	$ 25	♦	1	$ 25	♦	1	$ 25	♦	1	$ 25
Clean cooling vents of generator	♦	1	$ 5	♦	1	$ 5	♦	1	$ 5	♦	1	$ 5	♦	1	$ 5	♦	1	$ 5
Inspect hardware for wear/damage	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -
Inspect for electrical wear/damage	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -
Inspect electrical box wiring of Generator and Pump Motor	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -
Clean cabinet heat exchanger	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -
Check for NCGs in working fluid	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -
Check operation of compressed air system	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -	♦	0.5	$ -
Check HX water-side pressure drop				♦	0.5	$ -				♦	0.5	$ -				♦	0.5	$ -
Verify operability of safety equipment				♦	0.5	$ -				♦	0.5	$ -				♦	0.5	$ -
Clean enclosure / clean LLR				♦	2	$ 5				♦	2	$ 5				♦	2	$ 5
Replace PLC and HMI batteries										♦	0.5	$ 15						
Expander Exchange													♦	16	$ 22,266			
Replace VFD internal cooling fan																♦	1	$ 300
Service Interval Parts Total (USD)			**$ 40**			**$ 45**			**$ 40**			**$ 60**			**$ 22,306**			**$ 345**
Service Interval Labor Hours Total		**7**			**10**			**7**			**10.5**			**23**			**11**	

Current maintenance intervals are conservative, and may be extended based on field experience.

Estimated hours are based on time to perform service at site, and do not include any mobilization or transportation time to and from the site.

Costs shown are in USD.

3 Year Part Total (USD):	$22,836.43
3 Year Labor Hours Total:	68.5

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P+ S6000: 20 Year End User Maintenance Schedule

CUMULATIVE RUN TIME HOURS ON POWER+ GENERATOR

REQUIRED SERVICE WORK	4400	8800	13200	17600	22000	26400	30800	35200	39600	44000	48400	52800	57200	61600	66000	70400	74800	79200
	1 year		2 years		3 years		4 years		5 years		6 years		7 years		8 years		9 years	
Inspect all plumbing, flanges, and valves for leaks/ Check oil catch bottle	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Inspect coupling / expander and generator bearings	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Grease generator bearings	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Clean cooling vents of generator	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Inspect hardware for wear/damage	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Inspect for electrical wear/damage	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Inspect electrical box wiring of Generator and Pump Motor	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Clean cabinet heat exchanger	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Check for NCGs in working fluid	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Check operation of compressed air system	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Check HX water-side pressure drop		♦		♦		♦		♦		♦		♦		♦		♦		♦
Verify operability of safety equipment		♦		♦		♦		♦		♦		♦		♦		♦		♦
Clean enclosure / clean LLR		♦		♦		♦		♦		♦		♦		♦		♦		♦
Replace PLC and HMI batteries				♦				♦				♦				♦		
Expander Exchange					♦					♦					♦			
Replace VFD internal cooling fan						♦						♦						♦
Replace High Side PRVs & Low Side PRVs*									♦									
Replace Generator Bearings**																		

continued on chart below

CUMULATIVE RUN TIME HOURS ON POWER+ GENERATOR

REQUIRED SERVICE WORK	83600	88000	92400	96800	101200	105600	110000	114400	118800	123200	127600	132000	136400	140800	145200	149600	154000	158400	162800	167200	171600	176000
	10 years		11 years		12 years		13 years		14 years		15 years		16 years		17 years		18 years		19 years		20 years	
Inspect all plumbing, flanges, and valves for leaks/ Check oil catch bottle	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Inspect coupling / expander and generator bearings	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Grease generator bearings	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Clean cooling vents of generator	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Inspect hardware for wear/damage	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Inspect for electrical wear/damage	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Inspect electrical box wiring of Generator and Pump Motor	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Clean cabinet heat exchanger	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Check for NCGs in working fluid	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Check operation of compressed air system	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Check HX water-side pressure drop		♦		♦		♦		♦		♦		♦		♦		♦		♦		♦		♦
Verify operability of safety equipment		♦		♦		♦		♦		♦		♦		♦		♦		♦		♦		♦
Clean enclosure / clean LLR		♦		♦		♦		♦		♦		♦		♦		♦		♦		♦		♦
Replace PLC and HMI batteries		♦				♦				♦				♦				♦				♦
Expander Exchange		♦					♦					♦					♦					♦
Replace VFD internal cooling fan						♦						♦						♦				♦
Replace High Side PRVs & Low Side PRVs*	♦										♦										♦	
Replace Generator Bearings**			♦																			

Current maintenance intervals are conservative, and may be extended based on field experience.

* PRVs should be replaced immediately if they discharge or show signs of water ingress. PRVs should be replaced at the interval required by local code or every 5 years, whichever is lower.
** Generator bearings are rated for 100,000 hours of operation.

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